USGS
science for a changing world

nehrp

USGS Update

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(with thanks to David Applegate)
U.S. Geological Survey
February 9, 2012

Statuatory Roles and Responsibilities

- USGS has the delegated federal responsibility to provide notifications and warnings for earthquakes, volcanic eruptions, and landslides.
- USGS seismic networks support NOAA's tsunami warnings.





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USGS role in National Tsunami Hazard Mitigation Program

- Member of the NTHMP Coordinating Committee
- Operation and maintenance of “CREST” broadband seismic stations in CA, OR, WA, AK, HI (since 2009 supported by NOAA spectrum funds)
- Support for NTHMP activities approved by the Coordinating Committee
  - Booklet on lessons learned from tsunamis
  - Support for Washington State-Local Tsunami Workgroup activities
  - Vulnerability studies for Pacific states
  - Gulf Coast tsunami assessment
  - Representatives to subcommittees as needed, particularly Mapping and Modeling

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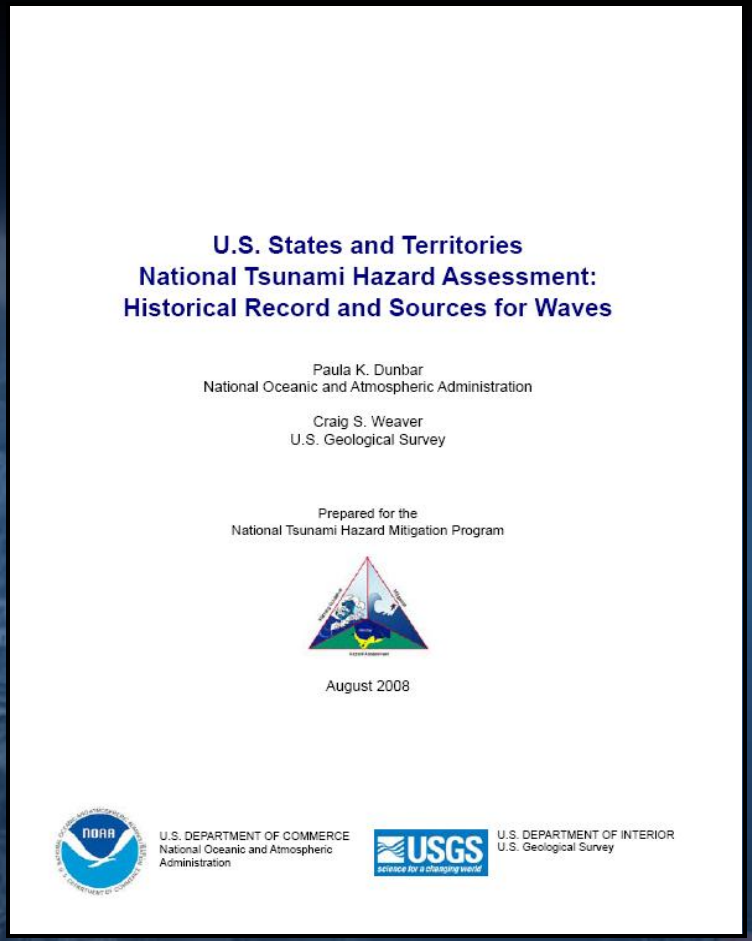
USGS support for NTHMP: Examples



U.S. States and Territories
National Tsunami Hazard Assessment:
Historical Record and Sources for Waves

Paula K. Dunbar
National Oceanic and Atmospheric Administration

Craig S. Weaver
U.S. Geological Survey

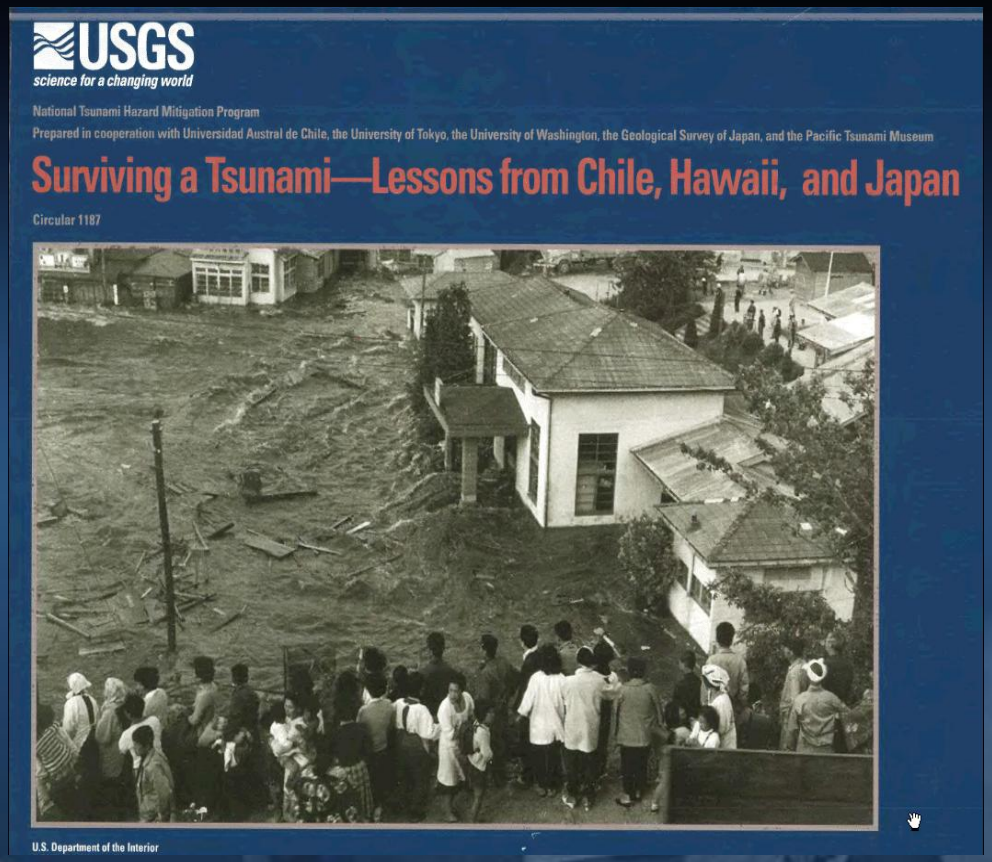
Prepared for the
National Tsunami Hazard Mitigation Program

August 2008

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration

U.S. DEPARTMENT OF INTERIOR
U.S. Geological Survey

National assessment



Lessons learned booklet

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Connecting coastal and marine geology with tsunami hazards

USGS Tsunami Science Priorities:

- Assess Tsunami Hazards – Earthquakes, Volcanoes, Landslides
- Identify Potential Tsunami Sources
- Map Tsunami-Prone Coasts
- Create Simulations of Tsunami Inundation

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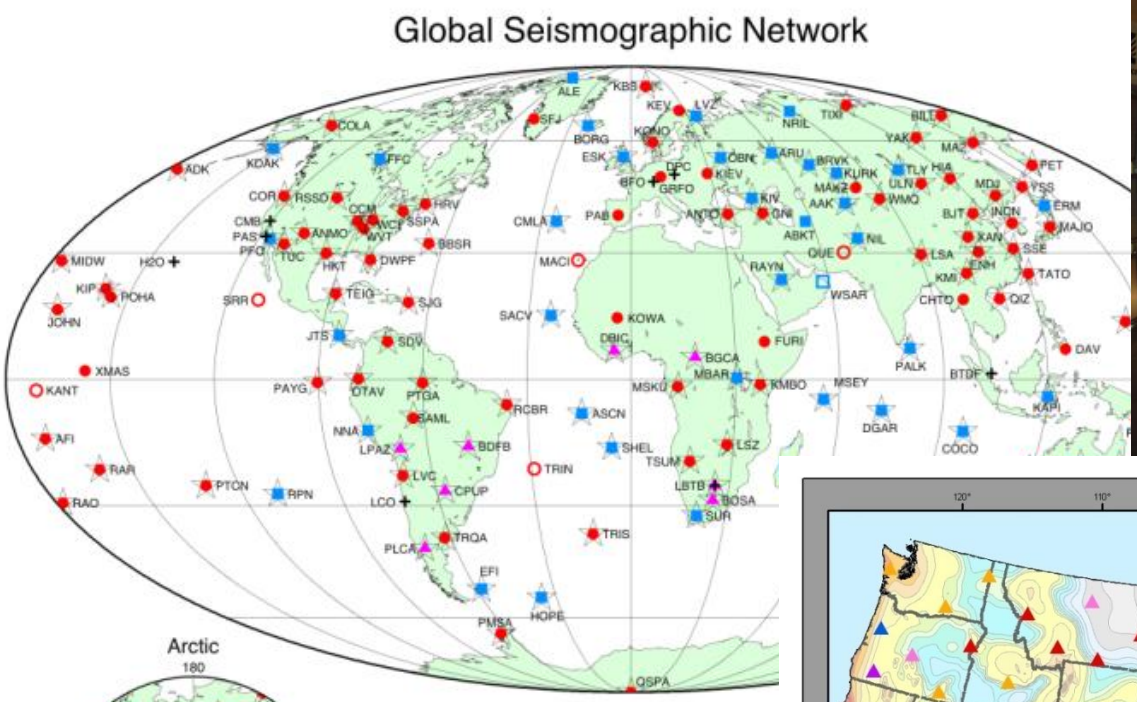
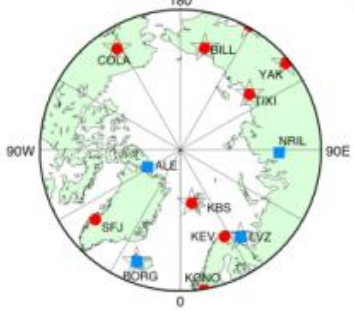
USGS provides rapid information on earthquakes worldwide





Installed Planned

85 6 IRIS/USGS Stations

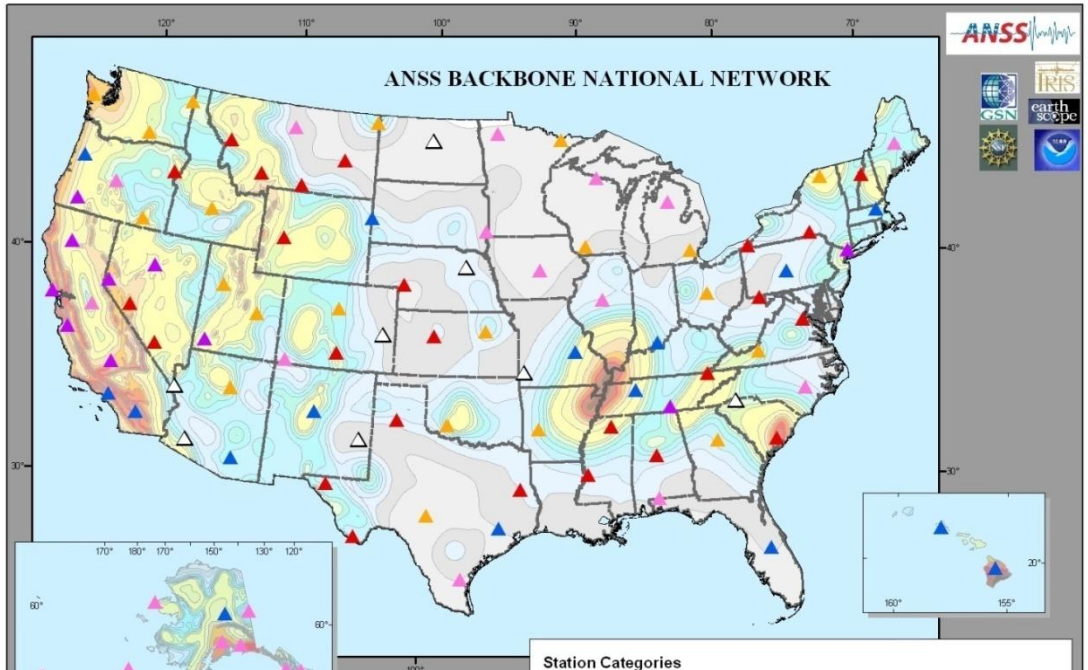
39 2 IRIS/IDA Stations (UCS

8 Other/Affiliated GSN S

9 GTSN Stations (AFTA

117 Telemetered stations

USGS Albuquerque Seismological Labora
January 27, 2005 (crh/lw)



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NSF

IRIS

2004 Sumatra megaquake forced a rethinking of likely tsunami sources

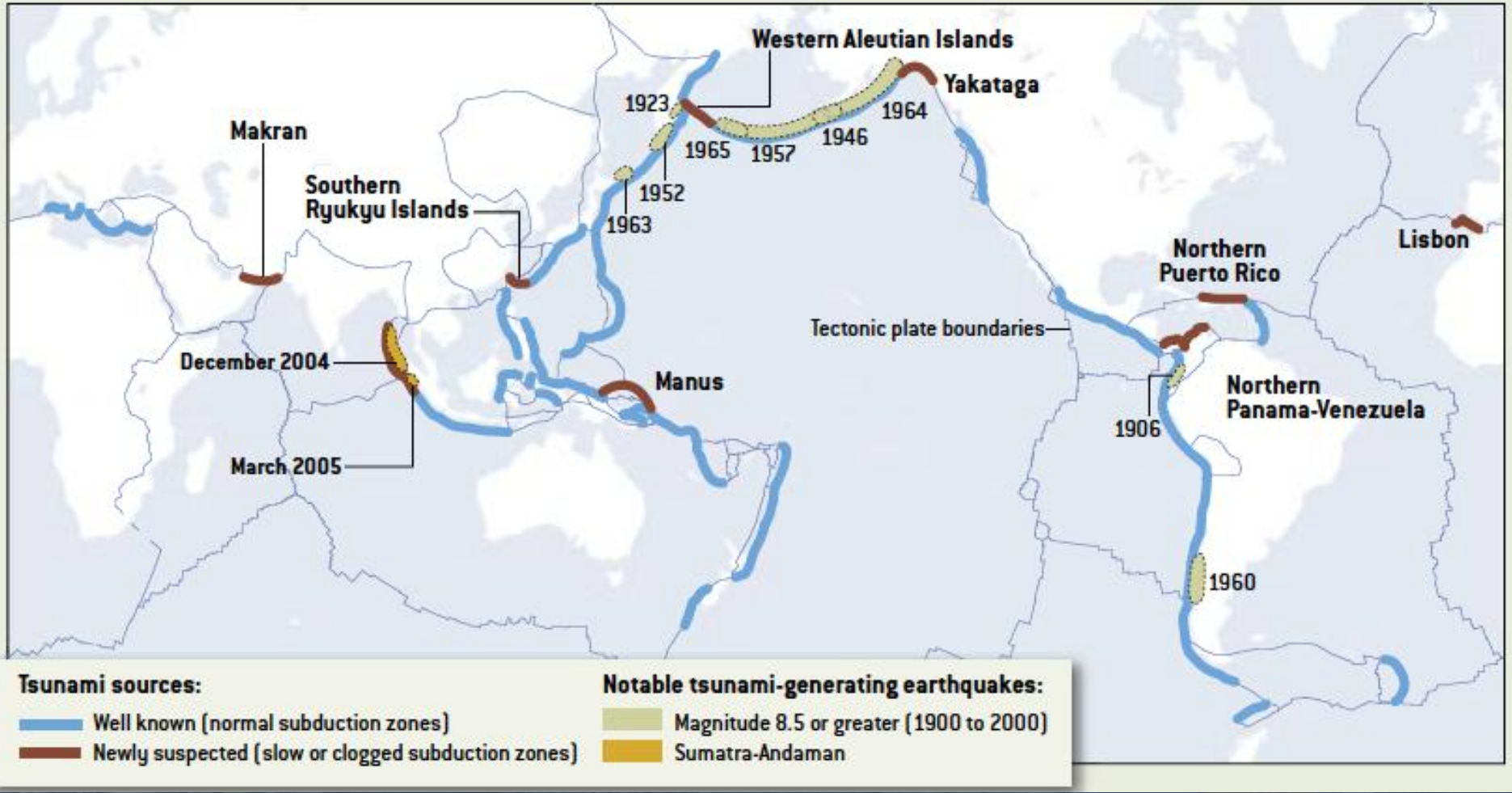
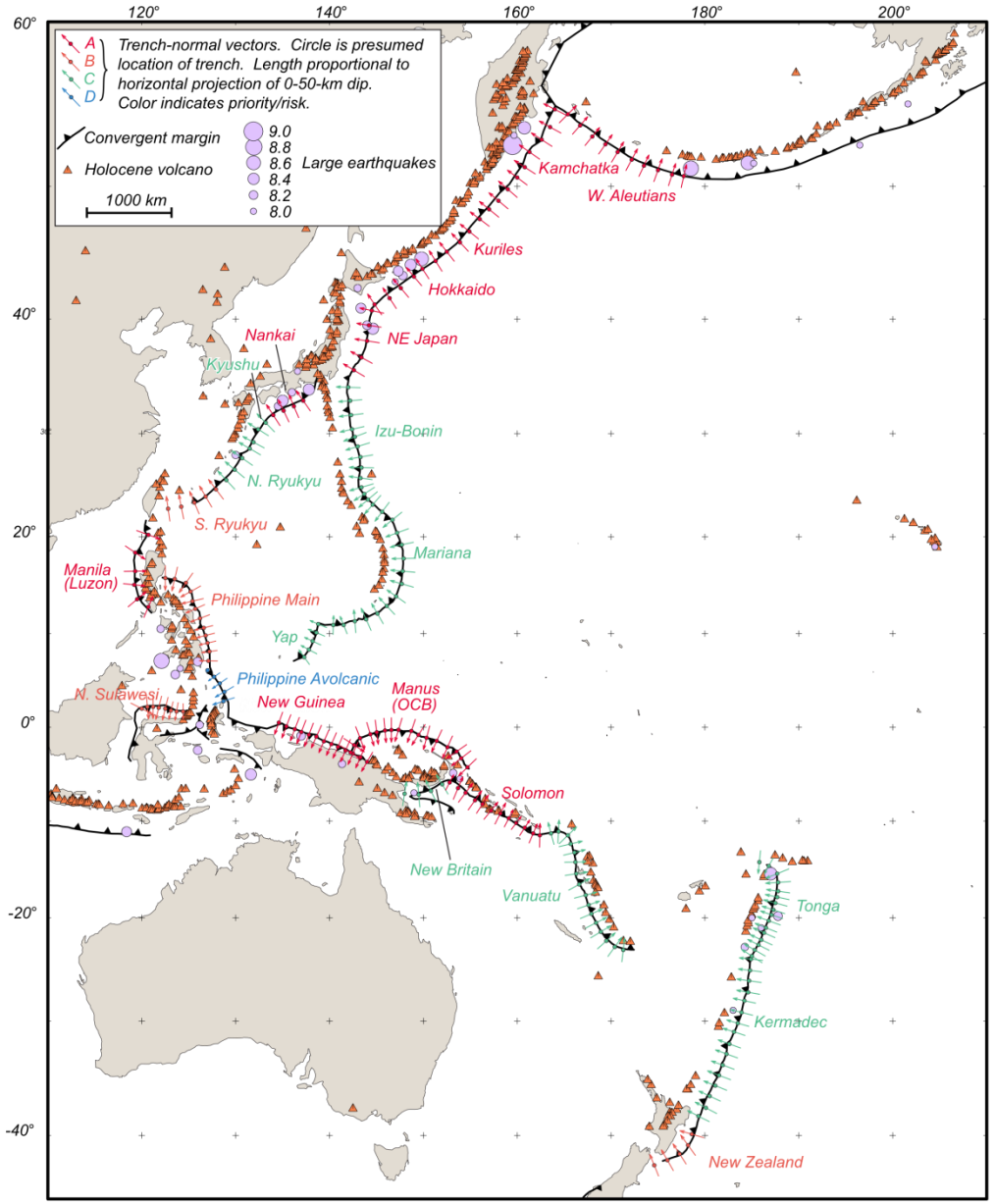


Figure from Geist, Titov, and Synolakis, 2005

Potential tsunami-generating fault zones in the Western Pacific

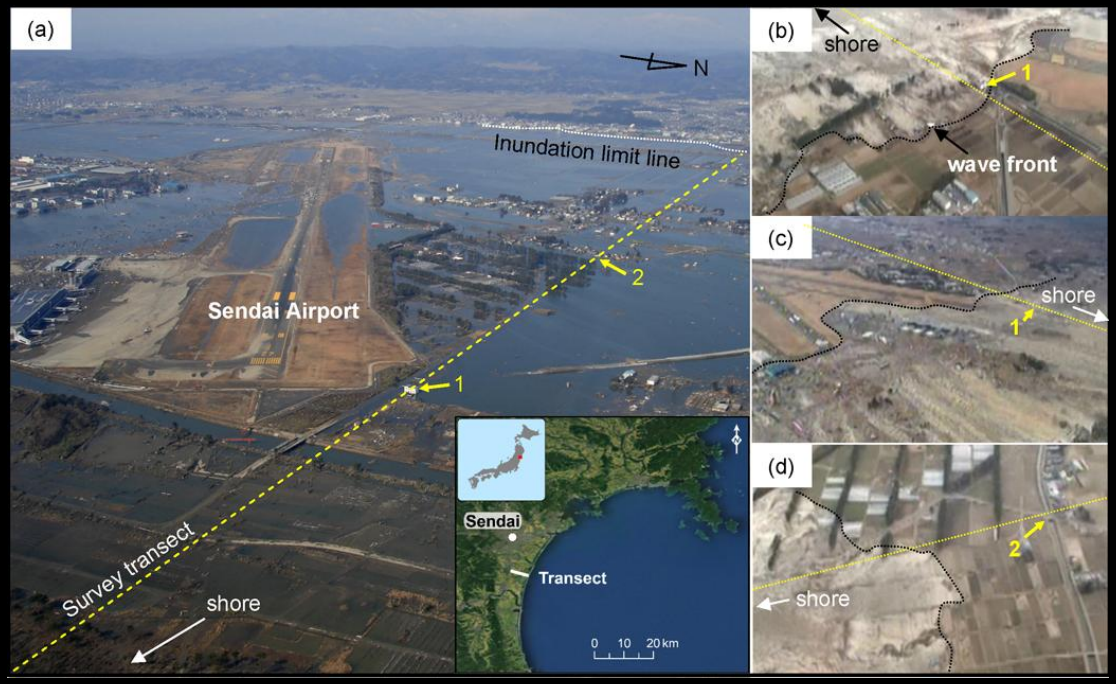
- Characterization of geometry and large earthquake potential
- Used by NOAA to optimize DART deployment and build next-generation forecast database



2011 Tohoku tsunami field survey

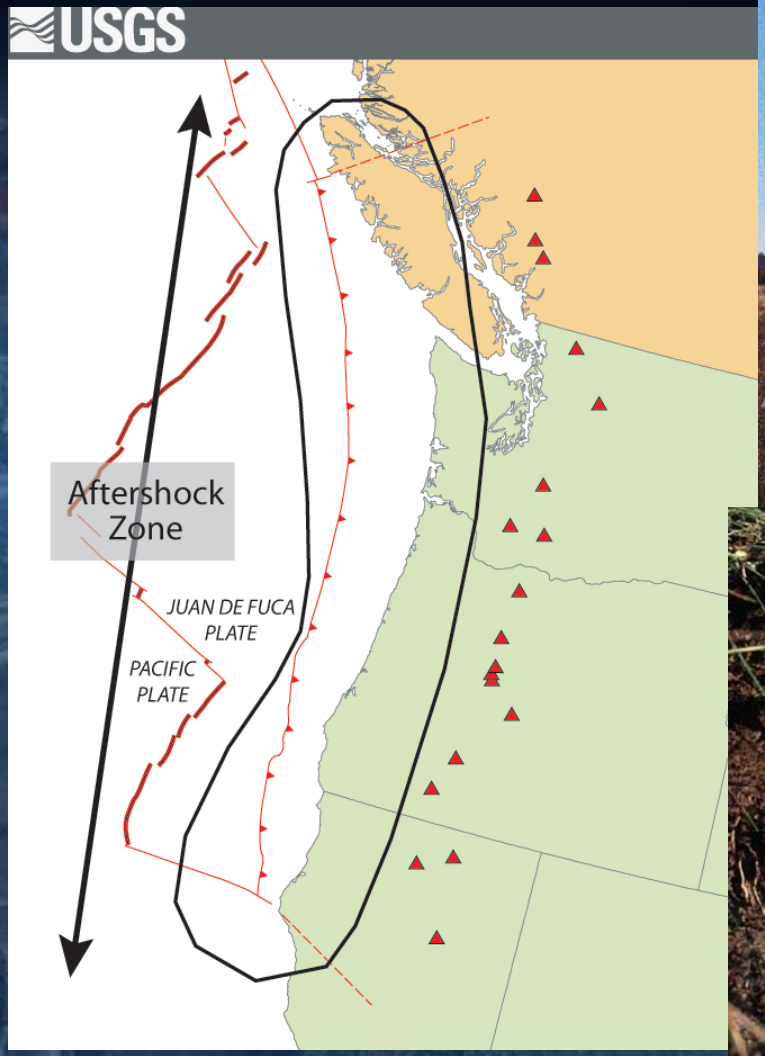
Japan Sendai Airport ITST

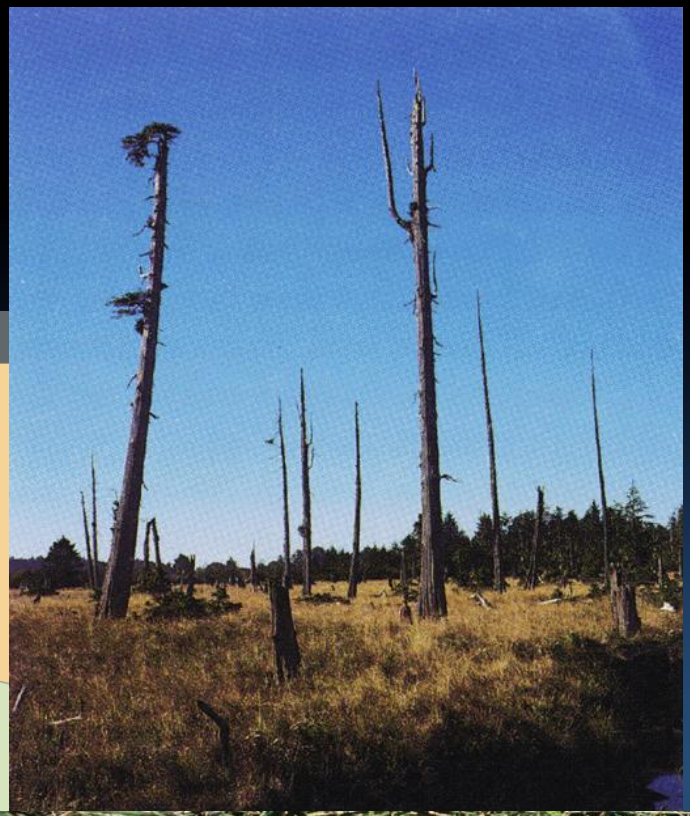
- 11 scientists from Japan, US, Australia, UK, Poland, and Indonesia participated in May 4-11 field survey
- Focused on 4 km transect near Sendai airport
- Collected water level, tsunami deposit, topographic, flow direction, and geochemical data



The 869 Jogan tsunami deposit is found below the 2011 tsunami deposit on the Sendai coastal plain

The January 27, 1700 Cascadia earthquake/tsunami





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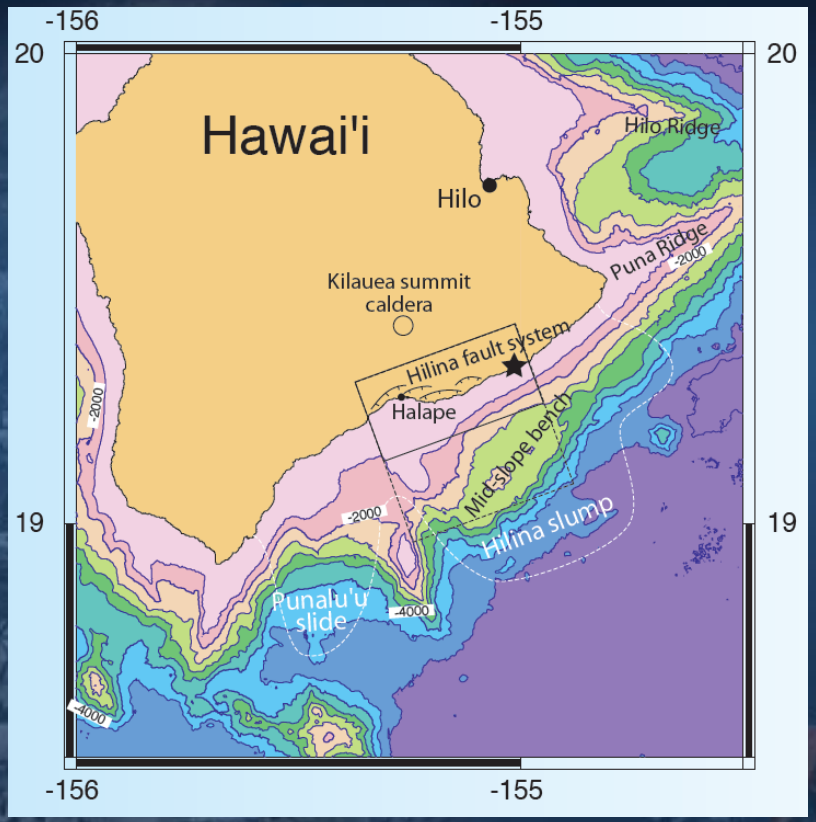
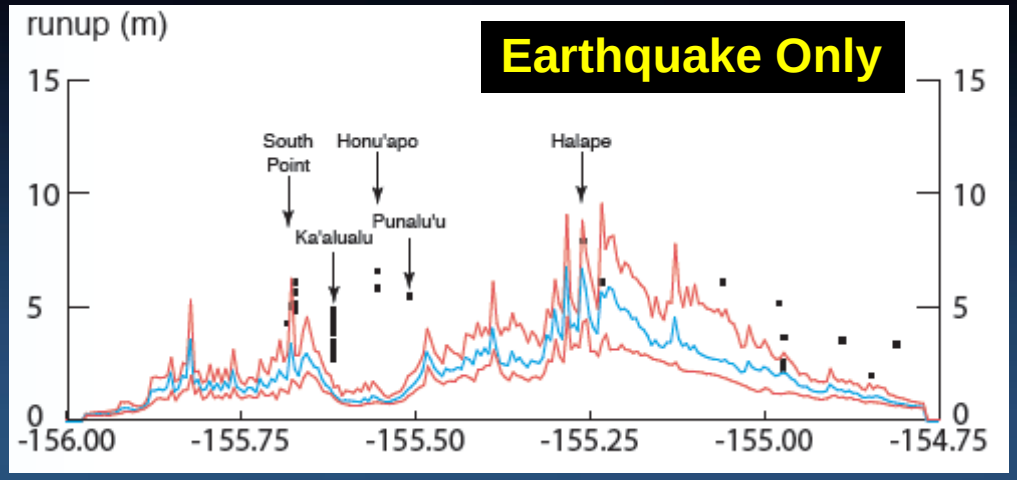
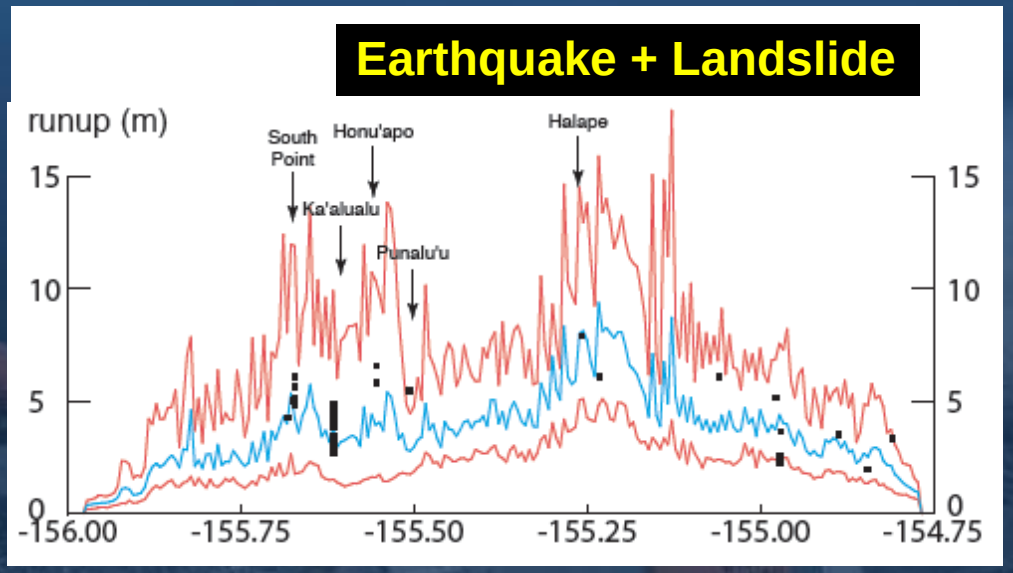
A one-two-three punch: Earthquake-triggered landslides triggering tsunamis

1975 Kalapana tsunami







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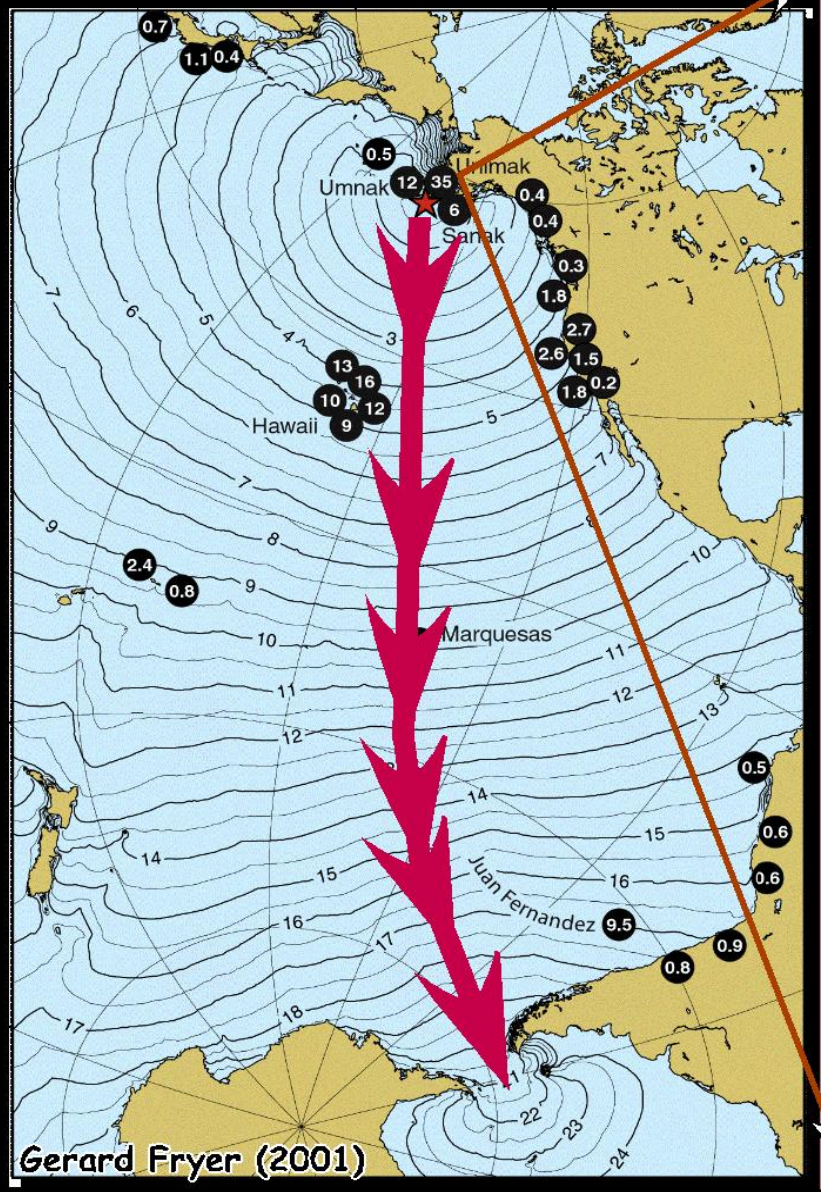
Source: Eric Geist

Great, 1946 April Fool's Day Unimak or Scotch Cap EQ (Mw=8.6) and tsunami

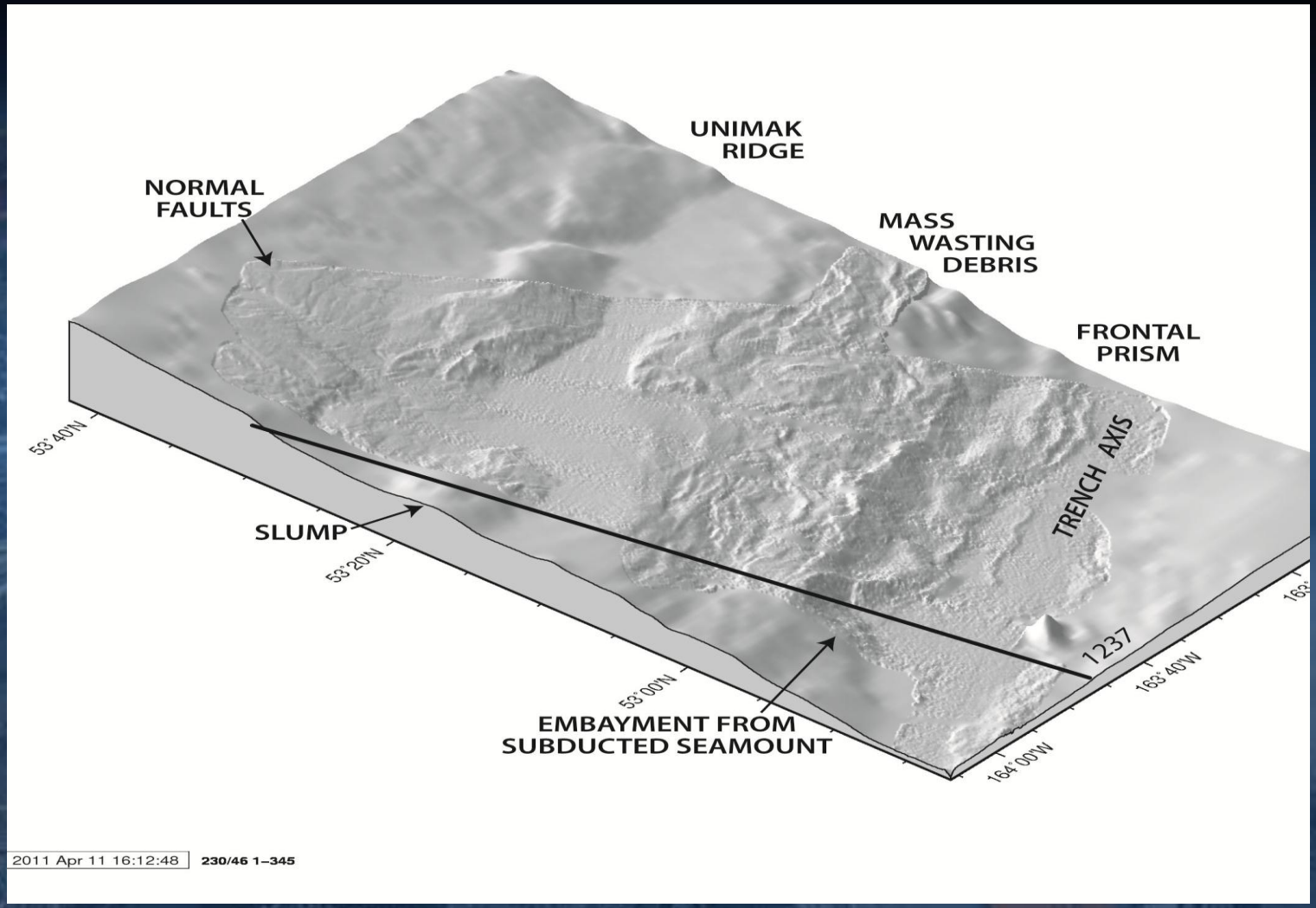


Scotch Cap Lighthouse,Western end of Unimak Island

Before April 1, 1946

After April 1, 1946

Source area of 1946 Scotch Cap tsunami—a large landslide was probably involved



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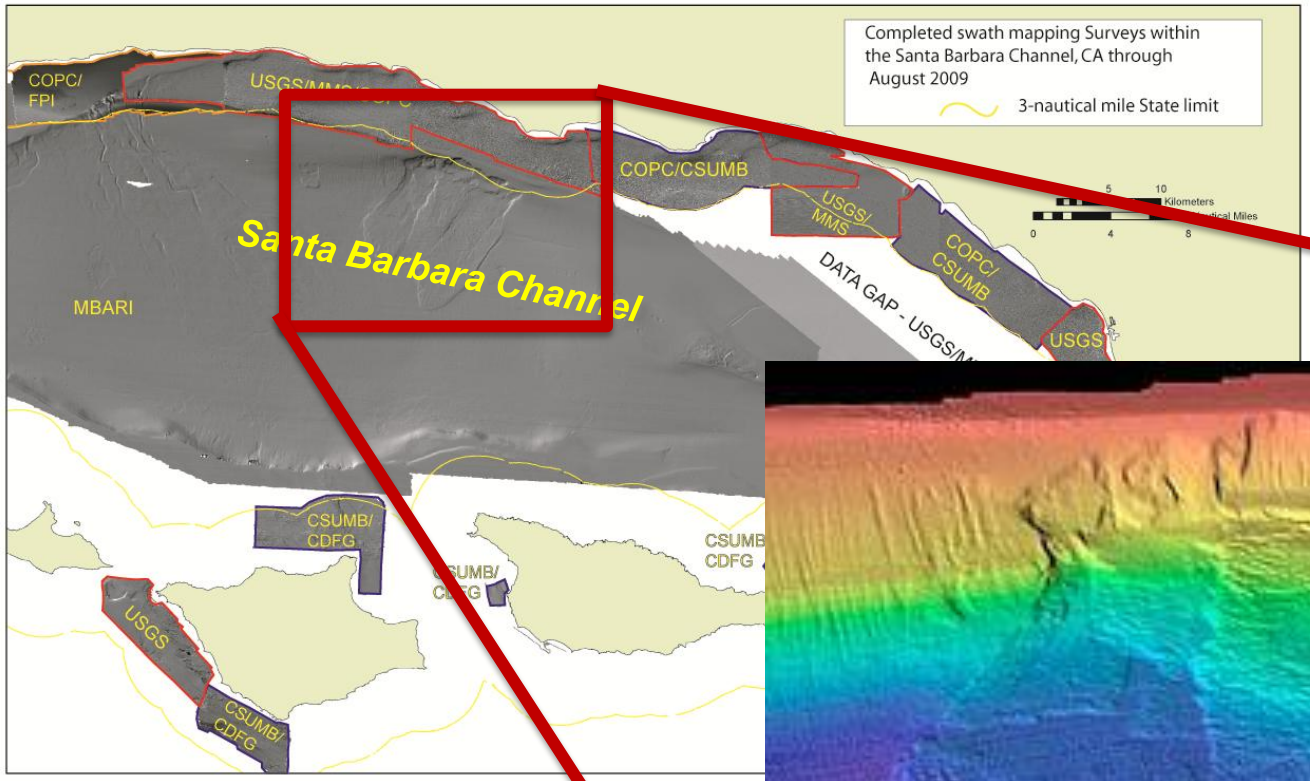
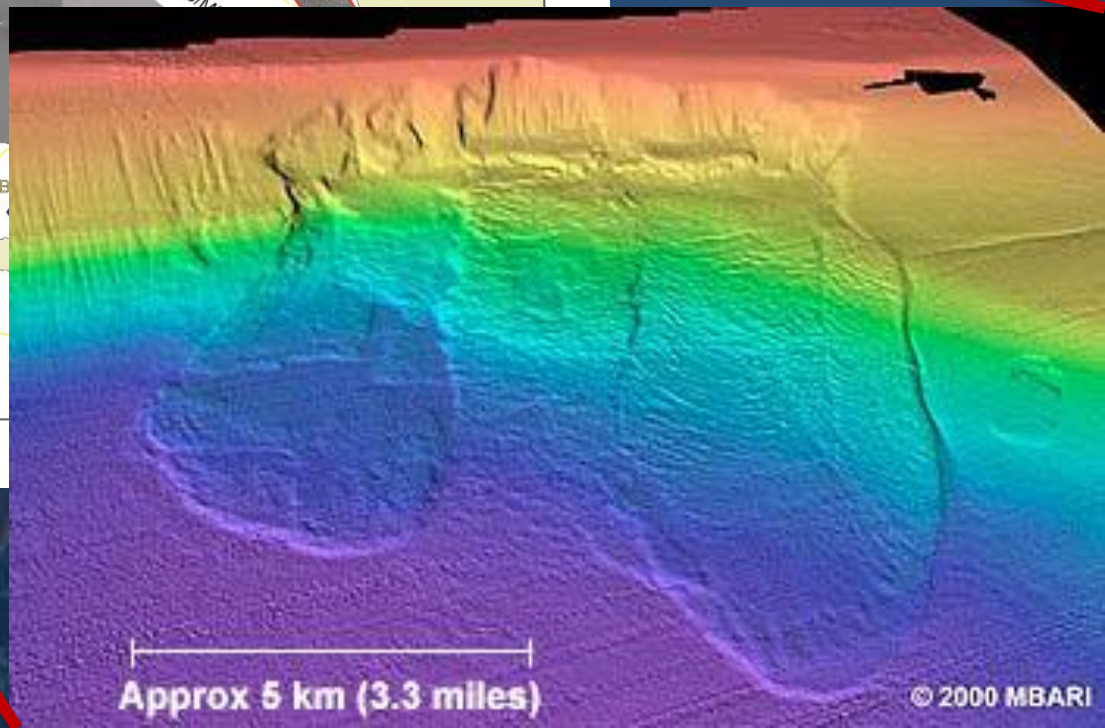
Courtesy of Roland von Heune

Goleta submarine landslide complex off southern California





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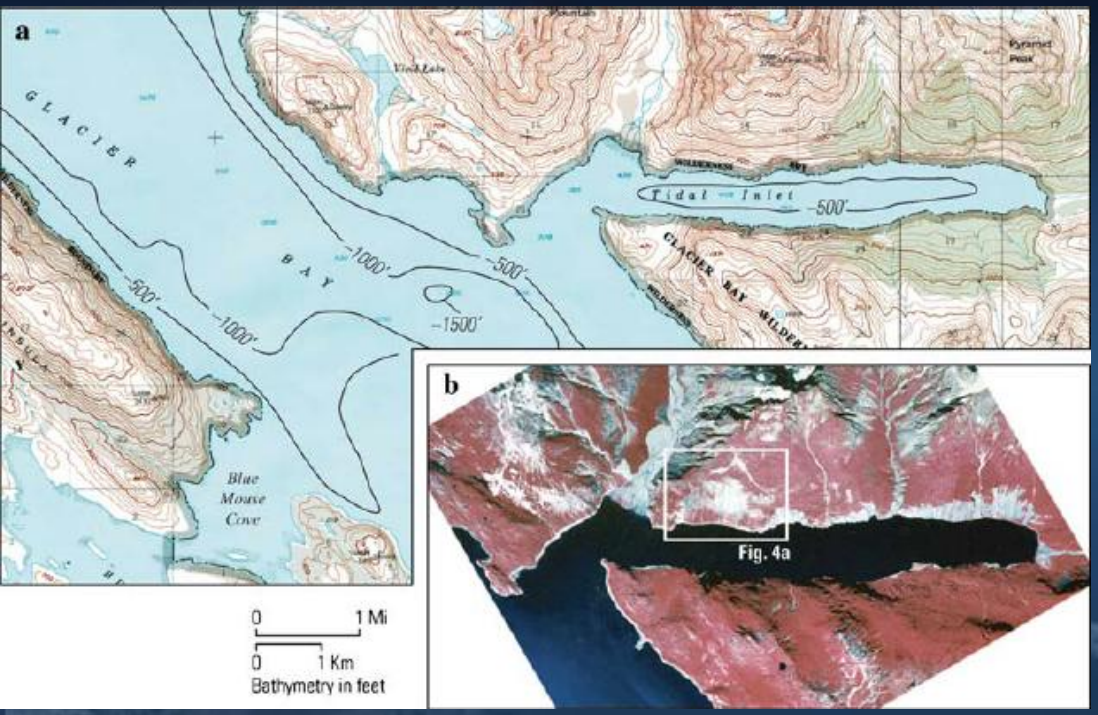
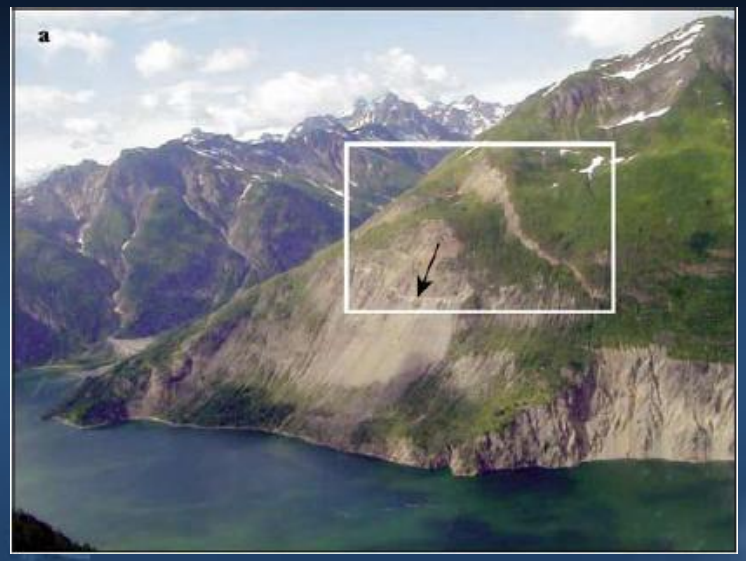
Landslide-generated tsunami hazard in Glacier Bay National Park – echoes of Lituya Bay





Landslide perched above northern shore of Tidal Inlet

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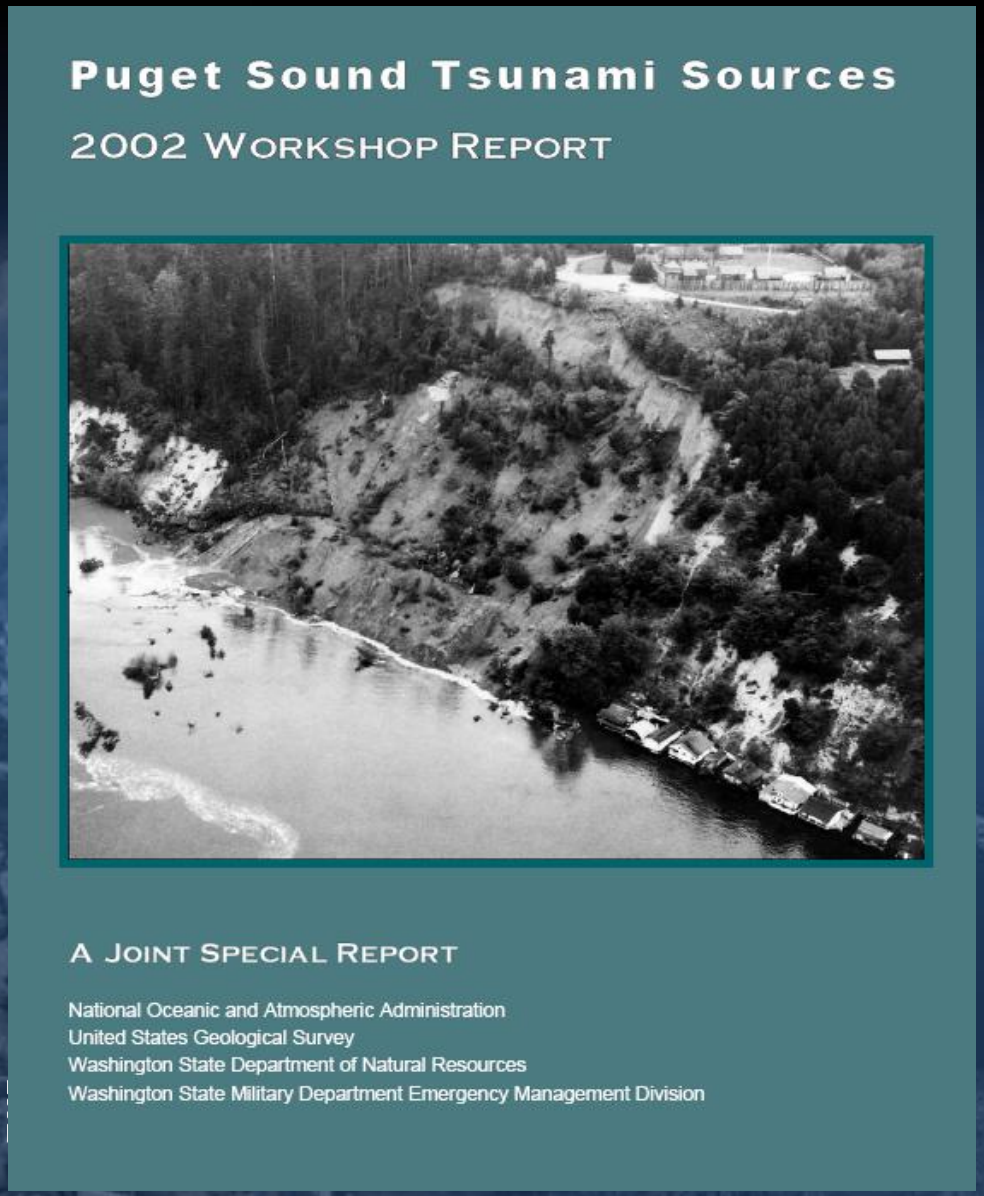
From Wieczorek et al. (2007)

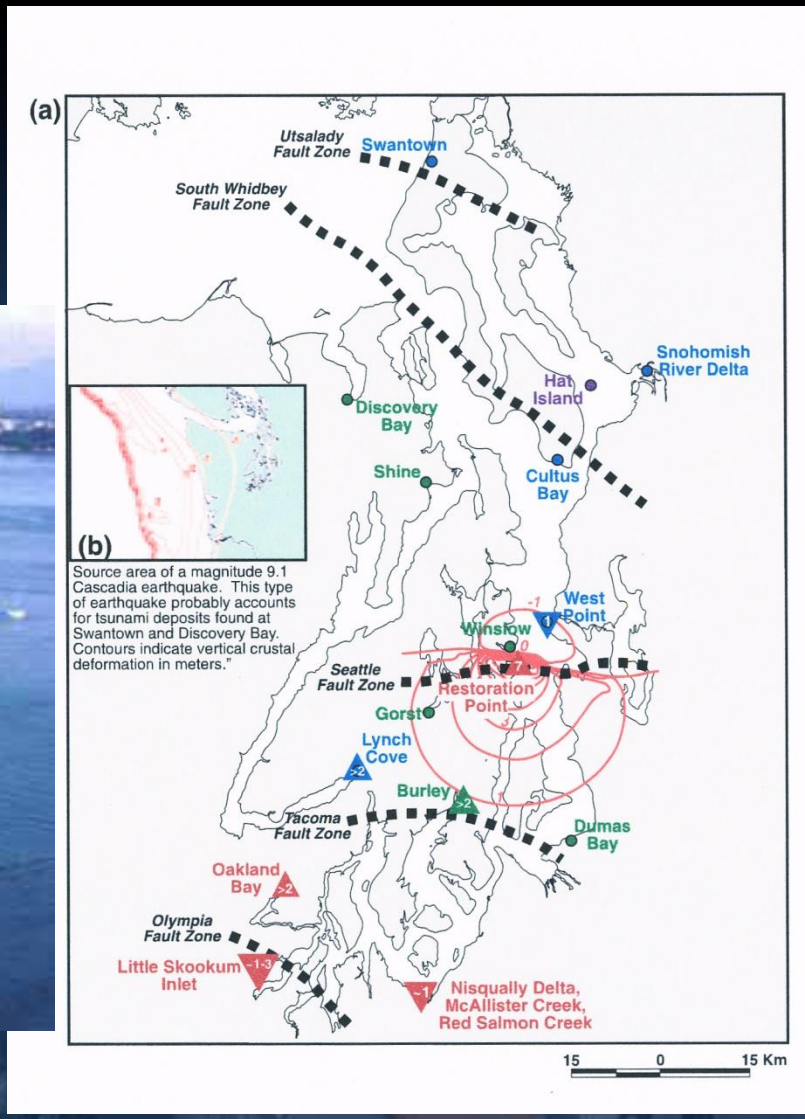
Tsunami sources in Puget Sound



Numerous local tsunamis in Puget Sound are caused by landslides above and below the water line, delta failures, and earthquakes. A multi-agency workshop report formed the basis for Puget Sound tsunami assessments.

Tsunami sources in Puget Sound

Three faults are possible major tsunami sources: Seattle, Tacoma, and South Whidbey Island faults.



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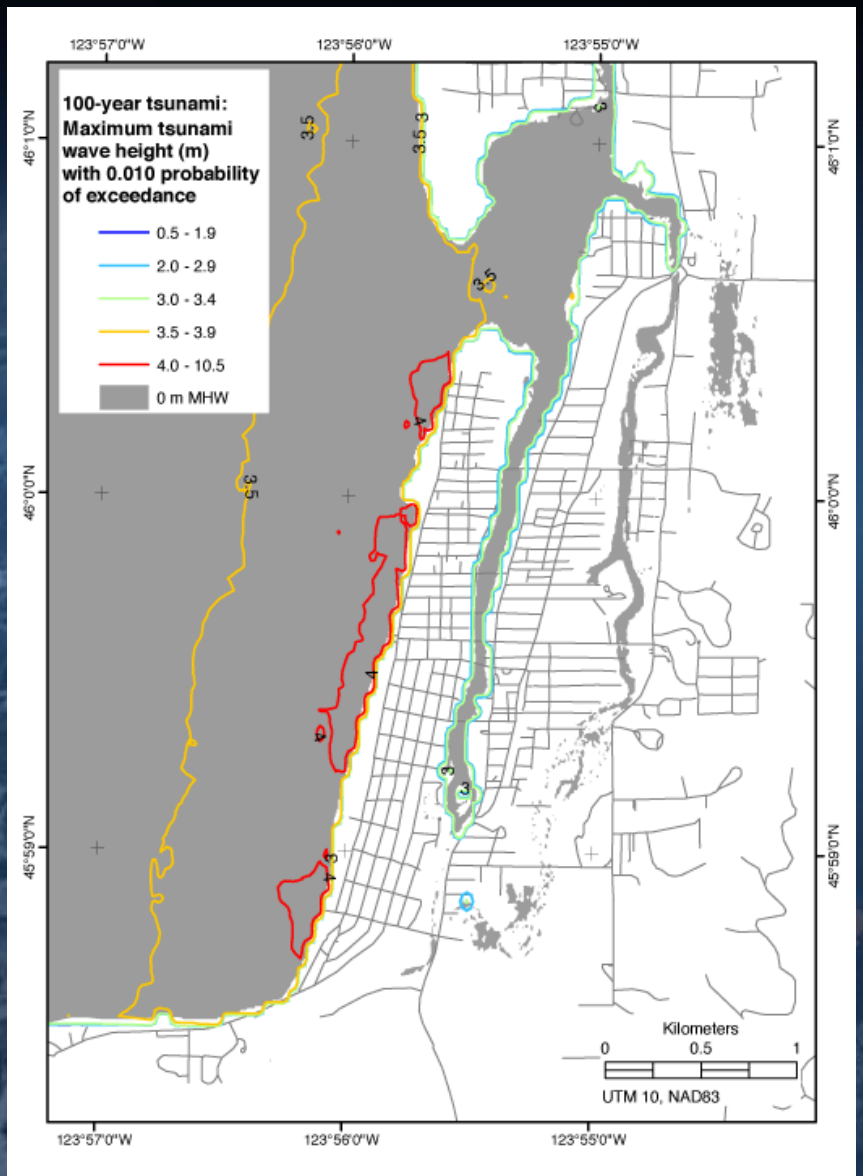
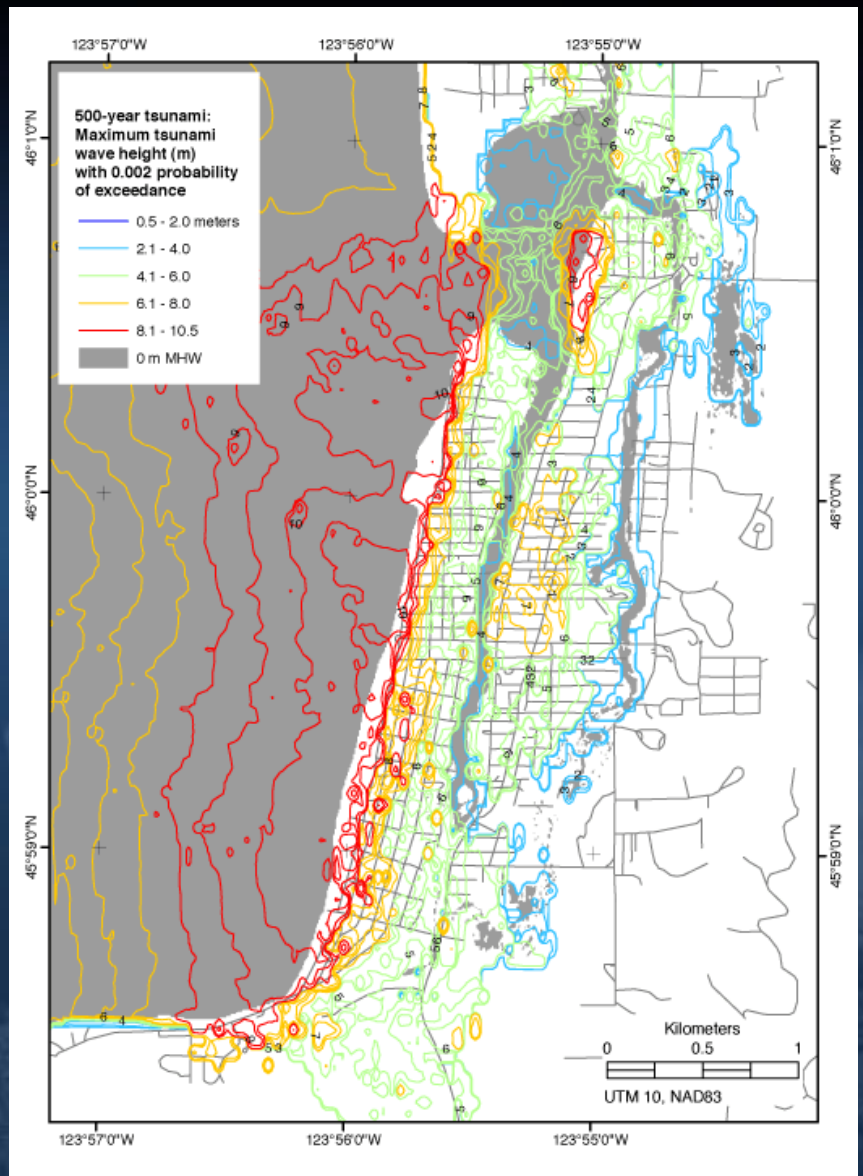
Probabilistic tsunami hazard maps: FEMA tsunami flooding maps for Seaside OR

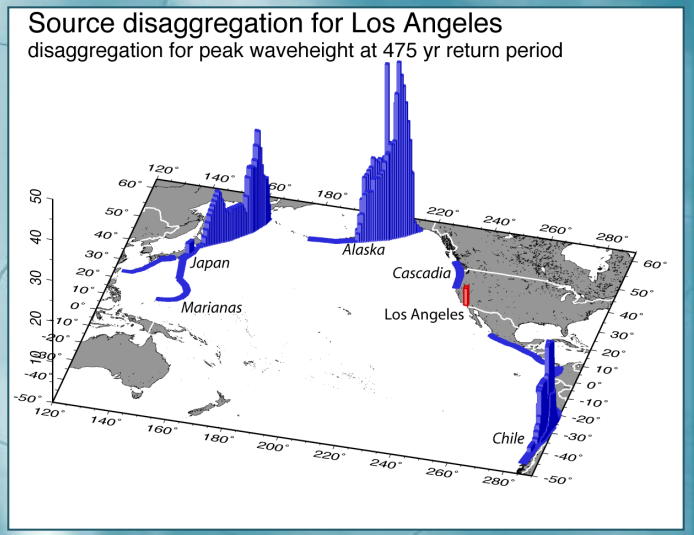




In Progress Now: A Tsunami Scenario

Scope:

- mag 9.0 quake in Eastern Aleutians
- inundation modeling, west coast U.S.
- current modeling, ports of Los Angeles and Long Beach



Emphases on:

- the ports
- localized, highly damaging currents
- land use and other policy implications